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APPLICATION FOR LETTERS PATENT

for

**SYNTHESIS OF ENERGETIC THERMOPLASTIC ELASTOMERS  
CONTAINING OLIGOMERIC URETHANE LINKAGES**

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## SYNTHESIS OF ENERGETIC THERMOPLASTIC ELASTOMERS CONTAINING OLIGOMERIC URETHANE LINKAGES

[0001] Priority is claimed on United States Provisional Application 60/108,456 filed on November 12, 1998, the complete disclosure of which is incorporated herein by reference.

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

[0002] This invention relates to energetic thermoplastic elastomers which are useful as binders of high-energy compositions, such as propellants, especially rocket propellants and gun propellants, explosive munitions, gas generants of vehicle supplemental restraint systems, or the like, and to methods for synthesizing the same.

#### 2. Description of the Related Art

[0003] Solid high-energy compositions, such as propellants, explosives, gasifiers, and the like comprise solid particulates, such as fuel particulates and/or oxidizer particulates, dispersed and immobilized throughout a polymeric binder matrix.

[0004] Conventional solid composite propellant binders utilize cross-linked elastomers in which prepolymers are cross-linked by chemical curing agents. As outlined in detail in U.S. Patent No. 4,361,526, there are important disadvantages to using cross-linked elastomers as binders. Cross-linked elastomers must be cast within a short period of time after addition of the curative, which time period is known as the "pot life." Disposal of a cast, cross-linked propellant composition is difficult, and usually is accomplished by burning, which poses environmental problems. Furthermore, current state-of-the-art propellant compositions have serious problems that include their use of nonenergetic binders which have lower performance and high end-of-mix viscosities.

[0005] In view of the inherent disadvantages associated with the use of cross-linked elastomeric polymers as binder materials, there has been considerable interest in developing thermoplastic elastomers suitable as binders for solid, high energy compositions. However,